

Locating air quality monitoring stations utilizing computational fluid dynamics

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Abstract

With the advancement of high-resolution Computational Fluid Dynamics (CFD), measurements of variables related to the urban environment, such as air quality, can be optimized. Regarding smart solutions for the future cities, CFD allows for the optimizing of location for instrumentation to monitor air quality in order to facilitate optimized measures to counteract any potential detrimental effect on the local populations' health, at relatively low cost. To illustrate the power and efficiency of CFD this paper reports on a study in Kuwait of the dispersion of CO₂ gas. Based on the case of dispersion of CO₂ emanating from traffic in a busy street and in the vicinity of a complex configuration of buildings located in Salmiya, Kuwait City, the suggested location for installing air quality monitoring instrumentation has been identified for two situations: before and after adding a new building. Before adding the new building, the highest CO₂ concentration was found in the immediate proximity of the residential buildings some 200 m South-East of the main street. After adding the new building, the highest CO₂ concentration was found on the windward side of the new building immediately next to the main street. The new configuration of buildings suggests a new location for any air quality monitoring instrumentation in order to measure the highest concentration of air pollution.

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